

REMARKS

Applicant thanks the Examiner for the thorough consideration given the present application. Claims 2, 3 and 5-8 are currently being prosecuted. The Examiner is respectfully requested to reconsider his rejections in view of the amendments and remarks as set forth below.

Claim for Priority

It is gratefully acknowledged that the Examiner has recognized Applicant's claim for foreign priority and the receipt of the certified copy. In view of the fact that Applicant's claim for foreign priority has been perfected, no additional action is required from Applicant at this time.

Drawings

The official draftsman has objected to the Figures as not including the legend "Prior Art". Applicant is submitting herewith replacement Figs. 1 and 2 which include the legends. Accordingly, Applicant submits that this objection is overcome.

Acknowledgment of Information Disclosure Statement

The Examiner has acknowledged the Information Disclosure Statement filed on April 8, 2004. An initialed copy of the PTO-1449 has been received from the Examiner. No further action is necessary at this time.

Title

The Examiner objected to the Title as being non-descriptive. Applicant is submitting herewith a new title as suggested by the Examiner.

Rejection Under 35 U.S.C. § 102

Claims 1, 2, 4 and 5 stand rejected under 35 U.S.C. § 102 as being anticipated by Harada et al. (U.S. Patent 5,491,392). This rejection is respectfully traversed.

The Examiner states that Harada et al. shows a method for controlling a mains bridge of a four-quadrant PWM frequency converter provided with a DC intermediate circuit when the power is flowing in the direction towards the power supply. The Examiner further states that the converter is provided with an AC inductor to be connected to an alternating voltage source, a controlled mains bridge, a DC intermediate circuit and a controlled load bridge for feeding a variable-frequency alternating voltage into a load. The mains bridge is provided with controlled semiconductor switches and shunt diodes and the mains bridge is controlled in a manner that the controlled semiconductor switch in the upper branch of the phase having the highest supply voltage instantaneous value and the controlled semiconductor switch in the lower branch of the phase having the lowest supply voltage instantaneous value are conducting so that the control mains bridge semiconductor switch to be conducting next is advanced by a time sufficient to cause the current of the conducting phase to turn from negative to positive before commutation.

Applicant disagrees that the claims are anticipated by this reference. First, Applicant has canceled claims 1 and 2 and rewritten these claims as independent claims 7 and 8. In so doing, Applicant has placed the claims in standard U.S. format in order to further clarify the invention.

Accordingly, claim 7 now describes a method for controlling the mains bridge having a combination of steps, including providing the frequency converter, controlling the mains bridge so that the switch in the upper branch and the switch in the lower branch are conducting and advancing the control of the mains bridge switch to be conducting next by a time sufficient to cause the current of the conducting phase to turn from negative to positive before commutation, where the size of the time is determined by the size of the current in the mains bridge. In particular, Applicant wishes to point out that the limitation related to the size of the time has now been introduced into these rewritten claims.

Applicant submits that claim 7 is not anticipated by Harada et al. In particular, Harada et al. does not show the combination of steps in the method of claim 7. Harada et al. show a timing adjusting means 5 which provides an adjustment signal ST which causes the switches to be advanced with a constant time. Thus, the reference does not in any fashion teach that the size of the advance time varies according to the current. Instead, it is noted at column 8, lines 9 and 10, the times are varied in accordance with the inductance of the power source and an inductance L. Clearly, this time is not varied as a function of the breaking current as in the present invention. Further, in Harada et al., the DC intermediate circuit is provided with a resistor-diode parallel coupling where the resistor limits the current. Such coupling is not needed in the present invention where the breaking current varies freely. Thus, the system of Harada et al. would not operate in the control system according to the present invention. It is further noted that Harada et al. relates to a servo motor control system with the power flowing back to the supply is typically much less than the power used in typical PWM frequency converters. For these reasons, Applicant submits that the combination of steps of claim 1 is not seen in the reference.

Likewise, claim 4 describes a frequency converter having a combination of elements including a mains bridge controlled by a control unit, an AC inductor connected to an alternating voltage source, a DC intermediate circuit, a control load bridge, the mains bridge being controlled so that the upper branch and lower branch are conducting, the control unit advancing the control of the switch to be conducting next by a time sufficient to cause the current to turn from negative to positive just before commutation and where the size of the time varies according to the current in the mains bridge. Applicant submits that Harada et al. does not show this combination of elements either. Since this apparatus claims corresponds to method claim 1, the arguments presented above in regard to claim 7 apply here as well. Accordingly, Applicant submits that claim 8 likewise is not anticipated by the reference.

Claims 2, 3, 5 and 6 depend from claims 7 and 8 and as such are also considered to be allowable. In addition, these claims recite the specific formula for determining the size of the time which is being advanced, depending on the specific type of switches used. Applicant submits that these claims are additionally allowable since the Harada et al. reference does not in any manner describe the specific time sizes. As discussed above, the time signal ST is the constant and does not vary. Accordingly, Applicant submits that claims 2, 3, 5 and 6 are likewise allowable.

Rejection Under 35 U.S.C. § 103

Claims 3 and 6 stand rejected under 35 U.S.C. § 103 as being obvious over Harada et al. in view of Fujioka (U.S. Patent 4,928,052). This rejection is respectfully traversed.

First, Applicant submits that these claims are allowable based on their dependency from allowable claims 7 and 8. The Examiner admits that Harada et al. does not teach the use of thyristors as the switches. The Examiner feels that it would have been obvious to one of ordinary skill in the art to construct a mains bridge with thyristors as taught by Fujioka. Applicant submits that even if Fujioka does teach the use of thyristors, these claims remain allowable based on their dependency from allowable independent claims. Further, Applicant submits that this reference does not aid the Harada et al. reference in the rejection of the independent claims. Accordingly, submit that all of the claims are allowable over this combination of references.

It is also noted that in line 5 of paragraph 11 at page 5 of the Action, that the Examiner has referred to the Hammond reference rather than Fujioka. It is assumed that the correct reference should be the Fujioka reference in that location. The present comments are based upon this understanding.

Conclusion

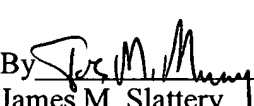
In view of the above remarks, it is believed that the claims clearly distinguish over the patents relied on by the Examiner, either alone or in combination. In view of this, reconsideration of the rejections and allowance of all of the claims are respectfully requested.

If the Examiner has any questions or comments, please contact Robert F. Gnuse, Reg. No. 27,295 at the offices of Birch, Stewart, Kolasch & Birch, LLP.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

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Respectfully submitted,

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